

# Factors Associated With Suicide in the Month Following Contact With Different Types of Health Services in Quebec

Helen-Maria Vasiliadis, M.Sc., Ph.D., André Ngamini-Ngui, Ph.D., Alain Lesage, M.D., M.Phil.

**Objective:** The aim of the study was to identify factors associated with suicide death occurring in the month following an outpatient visit, emergency room contact, or hospitalization.

**Methods:** The results of this study are based on data for 8,851 individuals ages 11 years and older who died between January 1, 2000, and December 15, 2007, and whose death was confirmed as suicide by the coroner's office in Quebec, Canada. Health service use in the year prior to death was assessed by review of data from the province's public health insurance agency. Multivariate logistic regression models were used to assess the association of clinical and socio-demographic factors and the occurrence of suicide death in the month following versus more than one month after the last use of health services.

**Results:** A total of 81.6% of suicide decedents had consulted on an outpatient basis, 48.7% had visited an emergency department, and 28.5% were hospitalized in the year prior to death. Among individuals who had been discharged from an emergency department or a hospital closest to their death, 29.5% and 75.3%, respectively, died in the month following discharge. The most consistent modifiable factor associated with death in the month following last contact was number of outpatient consultations following discharge.

**Conclusions:** Ensuring follow-up care after an emergency department visit or hospitalization may be associated with a longer period between discharge and suicide, allowing for more time to intervene and, possibly, prevent suicide.

*Psychiatric Services* 2015; 66:121–126; doi: 10.1176/appi.ps.201400133

Suicide is a major cause of premature and preventable death (1). In recent decades, the province of Quebec has consistently posted one of the highest suicide rates in Canada, as well as internationally (2). In 2008, Quebec's suicide rate was second highest among the provinces, reaching 13.7 per 100,000 inhabitants (3).

Between 77% and 94% of suicide decedents are in contact with health care services in the year prior to their death (4–7). A Canadian audit of suicides suggested that two streams of service deficits contribute to suicide. One stream of deficits, called primary care deficits, occurs when primary care settings fail to identify patients with less severe psychiatric disorders and to refer them to appropriate specialized mental health services. A second stream of deficits involves treatment gaps between emergency departments and specialized addictions services, resulting in insufficient postdischarge coordination and follow-up care (4).

Making use of large administrative databases, a study capturing all suicide deaths in Finland during a 20-year period showed that female sex, higher education, and the presence of an affective disorder or schizophrenia were associated with suicide within the immediate period after hospital discharge (8). Previous studies have also highlighted that the one-month

period (9) and the two-week (10) period after discharge are associated with the highest rates for completed suicides.

This study aimed to examine the patterns of use of health services among suicide decedents in Quebec in the year prior to death. It examined factors associated with suicide deaths that occurred within one month of a health service contact in inpatient, emergency department, and outpatient settings. Determining the factors associated with later suicide among individuals with suicidal behaviors can allow for greater opportunity to employ suicide prevention strategies, given that the presence of these factors would be associated with increased time to intervene.

## METHODS

### Study Cohort

This study was based on the 8,851 residents of Quebec ages 11 and older who had died by suicide between 2000 and 2007. Suicide decedents were identified from the death registry administered by the Quebec ministry of health and social services. Deaths by suicide were identified according to *ICD-10* codes (X60–X84 and Y87.0). These codes are registered in a

computerized data bank by the coroner's office of Quebec. Each death is investigated by the coroner, who then prepares a report confirming the death as a self-inflicted death with the intention of taking one's life.

### Data Sources

Data used in this study came from Quebec's health insurance plan (Régie de l'Assurance Maladie du Québec [RAMQ]), medical and pharmaceutical services registry, and the death registry from the ministry of health and social services. Quebec has a universal health care system, which means that, in principle, almost all contacts between residents of the province and physicians are captured in the RAMQ. The RAMQ databases contain all claims for medical services rendered in Quebec institutions and all physician fees paid by Quebec's Medicare system. In contrast, drug coverage in Quebec is provided either by the RAMQ public drug plan or by private drug insurance plans. The RAMQ public drug plan offers coverage to older adults ( $\geq 65$  years), persons who receive social assistance, persons who are unemployed, and persons who do not have access to employee assistance programs. Persons who are covered under a private drug plan use their own funds to pay into private insurance plans.

Because the RAMQ is a fee-for-service system, physicians file claims for reimbursement. Studies have shown that the data captured in the RAMQ medical services databases can be used as reliable health service use data (11). An earlier study also reported that data from the coroner of Quebec regarding identification of deaths by suicide were highly reliable; the data were subject to negligible underestimation compared with data from other provinces and countries (12). Linking all these data was possible through permission granted by the Commission d'Accès à l'Information. Ethics approval was granted by the Charles Le-Moyne Ethics Committee.

### Measures

The RAMQ database provides information on the type of setting in which the care was provided, so it is possible to differentiate whether care was given during a hospitalization, an emergency department visit, or an outpatient visit. An emergency department visit was identified as all claims by physicians for acts carried out in the emergency department on the same date. An outpatient visit included all claims made by the same physician on one day. Claims for outpatient services by two different physicians for the same patient on the same day were considered two visits.

Patients were retrospectively followed for up to one year prior to the date of death. We used three progressive and exclusive steps to categorize patients according to the type of contact with health services prior to death. In the first step, we identified patients who had outpatient medical visits only. These patients had a visit to a physician in a private office or clinic or an outpatient clinic in a hospital or other institution but had neither visited an emergency department nor been hospitalized during the past 12 months. We then identified patients who had a visit to an emergency

department during the past year and who had not been hospitalized after the emergency visit but who may have consulted with health care providers on an outpatient basis. In the last step, we identified patients who had been discharged from a hospital for any reason and had not returned to an emergency department since their discharge but who may have consulted on an outpatient basis.

Therefore, if an individual had more than one of the three types of contact in the 12 months before the month of death, the contact was categorized as emergency department visit or hospitalization, depending on which consult occurred closest to death. The number of outpatient visits following an emergency department visit and inpatient discharge was also considered. Individuals whose last contact was related to their death were reclassified according to the second most recent contact, as described above.

Information about individual and sociodemographic variables, such as age, sex, and coverage by the public drug plan (an indicator of employment status), was obtained from the RAMQ. Area of residence was categorized by type of medical region (university or peripheral, intermediate, and far or isolated) (13). Medical region was coded as peripheral for 13 individuals with missing information on area of residence. The presence of a psychiatric diagnosis was indicated by diagnoses of anxiety, depression, personality disorder, organic disorder, substance abuse, psychoses, paranoia, conduct disorders, affective disorders, attention-deficit hyperactivity disorder, mental retardation, and pervasive development disorders. The presence of a general medical condition was indicated by a diagnosis of arthritis, cardiac disease, disorders of the digestive system or endocrine system, diabetes, and diseases of the kidney, liver, and eyes. The variable "suicide period" was introduced to examine whether Quebec's Mental Health Action Plan for 2005–2010 had influenced the number of suicide deaths. This action plan represented a policy initiative in Quebec that resulted in the reorganization of mental health services. According to the plan, primary care providers would offer the bulk of mental health care with support from specialized services when needed (32).

### Statistical Analyses

Bivariate analyses were carried out to test for differences in study variables among individuals who did or did not use health services in the year prior to suicide. Chi square statistics were used to compare the characteristics of individuals who used only outpatient versus other health services in the year before suicide death. We carried out three multivariate logistic regression models to study the factors associated with death in the month following discharge (or within 60 days) from a last hospital stay, a last emergency department visit, and a last outpatient visit. The statistical analyses were conducted using SAS, version 9.2.

## RESULTS AND DISCUSSION

Table 1 summarizes the characteristics of persons who did or did not use any type of health service in the 12 months preceding suicide death between 2000 and 2007 in Quebec. It also

**TABLE 1. Characteristics of 8,851 suicide decedents by use of health services and odds for use of only outpatient versus all other services in the year before death**

Characteristic	Total (N=8,851)	Use of health services						Type of service						
		Yes (N=7,265)		No (N=1,586)		$\chi^2$	df	p	Outpatient only (N=2,626)		All other services (N=4,639) <sup>a</sup>		AOR <sup>b</sup>	95% CI
		N	%	N	%				N	%	N	%		
Sex						135.26	1	<.001						
Male	6,959	5,540	80	1,419	20				2,063	37	3,477	63	.99	.88–1.12
Female (reference)	1,892	1,725	91	167	9				563	33	1,162	67		
Age (years)						181.95	3	<.001						
<25 (reference)	1,104	793	72	311	28				268	34	525	66		
25–44	3,487	2,765	79	722	21				937	34	1,828	66	1.27	1.07–1.52
45–64	3,356	2,882	86	474	14				1,122	39	1,760	61	1.64	1.38–1.95
≥65	904	825	91	79	9				299	36	526	64	1.53	1.23–1.90
Year of suicide						.04	1	.84						
2000–2005 (reference)	6,847	5,617	82	1,230	18				2,038	36	3,579	64		
2006–2007	2,004	1,648	82	356	18				588	36	1,060	64	.95	.85–1.07
Medical region of residence						13.84	1	<.002						
University	2,902	2,445	84	457	16				844	35	1,601	65	.97	.87–1.08
Peripheral, intermediate, and far or isolated (reference)	5,949	4,820	81	1,129	19				1,782	37	3,038	63		
Public drug plan						143.09	1	<.001						
No (reference)	3,674	2,803	76	871	24				1,167	42	1,636	58		
Yes	5,177	4,462	86	715	14				1,459	33	3,003	67	.72	.65–.80
Psychiatric disorder						564.02	1	<.001						
No (reference)	3,883	2,762	71	1,121	29				1,397	51	1,365	49		
Yes	4,968	4,503	90	465	10				1,229	27	3,274	73	.36	.33–.40
General medical condition						637.60	1	<.001						
No (reference)	5,930	4,439	75	1,491	25				1,725	39	2,714	61		
Yes	2,921	2,826	97	95	3				901	32	1,925	68	.73	.65–.80

<sup>a</sup> All other services included emergency department visits, hospitalization, and outpatient services if other health services were used.

<sup>b</sup> Adjusted odds ratio

summarizes odds ratios for use of outpatient versus all other health services among individuals who used services in the year prior to death. Overall, 82.1% (N=7,265) of individuals had used any type of health service in the past year. Further, 81.6% (N=7,222) had consulted on an outpatient basis, 48.7% (N=4,312) had visited an emergency department, and 28.5% (N=2,519) were hospitalized in the year prior to death.

Among the 2,626 individuals who only consulted on an outpatient basis during the year before suicide death, 36.7% (N=964) died in the month following their last consultation. Among the 2,804 individuals whose most recent health service contact was an emergency room visit, 29.5% (N=828) died in the month following discharge. Among the 1,835 individuals whose most recent health service contact was hospitalization, 75.3% (N=1,381) died in the month following discharge. The factors associated with death in the month following (within 60 days of) an outpatient contact, emergency department visit, and hospital discharge are presented in Table 2.

Close to 18% of persons who died by suicide between 2000 and 2007 had not sought any health services in the year

prior to death. In concordance with previous studies (14,15), a majority of these individuals were male; were younger; and lived in peripheral, intermediate, and far or isolated medical regions. In contrast, a majority of persons who died by suicide were in contact with health care services in the year prior to their death, a finding that confirms previous studies (3–6,16). A four-year study using more recent data examined use of health services in the year prior to death in a large sample of individuals in Taiwan who died by suicide. Close to 25% had had contact with a psychiatrist, 80% with physicians other than psychiatrists in hospital settings, and 72% with a general practitioner (5). A Canadian audit of all suicide cases in a given year in New Brunswick indicated that 18% of suicide decedents had seen frontline medical services, 34% had seen specialist services, and 51% had seen any services (including the voluntary sector) in the month prior to death. A total of 49%, 53%, and 77% of the decedents had seen frontline medical services, specialist services, and any services (including the voluntary sector), respectively, in the year prior to death (3). Only 5% of the sample was in contact with addiction services in the past year, even though over 50% had a substance-related disorder (17).

**TABLE 2. Factors associated with suicide death in the month following use of health services, by type of contact**

Characteristic	Outpatient only		Emergency visit		Hospitalization	
	OR	95% CI	OR	95% CI	OR	95% CI
Male (reference: female)	.81	.65–1.00	.90	.74–1.10	1.17	.92–1.51
Age (years) (reference: <25)						
25–44	1.65	1.15–2.36	1.21	.92–1.59	1.00	.63–1.61
45–64	2.02	1.42–2.88	1.12	.85–1.49	.69	.43–1.09
≥65	2.10	1.37–3.22	1.79	1.23–2.59	.83	.49–1.41
Death in 2006–2007 (reference: 2000–2005)	1.13	.92–1.40	.99	.81–1.21	1.14	.88–1.47
Resides in university medical region (reference: peripheral, intermediate, and far or isolated region)	.81	.67–.99	1.03	.86–1.22	.81	.64–1.02
Public drug plan coverage (reference: no)	.97	.80–1.17	1.03	.86–1.24	1.16	.91–1.48
Psychiatric disorder (reference: no)	1.88	1.55–2.27	2.26	1.86–2.74	3.37	2.59–4.37
General medical condition (reference: no)	.87	.71–1.05	1.37	1.15–1.63	1.44	1.15–1.82
Number of outpatient visits in the year prior to death	1.21	1.18–1.24	—	—	—	—
Number of outpatient visits following emergency department or hospital discharge	—	—	.93	.90–.95	.96	.94–.97

The results of this study showed that the highest risk of suicide death in the month following health service contact was among individuals who were discharged from a hospital (75%). Similar findings reported by others indicate that almost half of suicide deaths occur within four weeks of hospital discharge and before the next follow-up appointment (18,19). This pattern highlights the importance of evaluating a patient's continued risk of suicide following an emergency department or hospital discharge and of ensuring close follow-up (20).

Gender was not associated with having died by suicide in the month following use of a health service or later, regardless of the setting of the last contact. A previous study of suicides among adolescents, however, showed that the time between suicide and the last contact with health services was shorter among girls than among boys (16). In the study reported here, older age (≥65 years) was associated with increased odds of death by suicide in the month following recent contact with an emergency department. Known risk factors for suicide, including depression, general medical illness, and social isolation, may contribute to an increase in suicide rates among the elderly (21). The presence of general medical disorders may also contribute to underdetection of depression, which can lead to underestimation of the risk of suicide in this population. In fact, although the Quebec national institute of public health reported a decrease in the overall suicide rate in the province between 1999 and 2008, the decrease was due to declines in adolescent suicide rates.

The number of outpatient contacts after a hospital discharge and an emergency department visit was also associated with the occurrence of suicide later than in the month following versus within the month after discharge, which supports studies indicating the importance of follow-up care

(9). The results also showed that among individuals who consulted on an outpatient basis only, the odds of dying by suicide within a month of using health services versus dying later was lower for persons who lived in a university medical region rather than in peripheral, intermediate, and far or isolated regions. The university medical region in Quebec consists of three university-affiliated metropolitan areas (Montreal, Quebec, and Eastern townships), which attract more specialist physicians and offer more services compared with other regions (12). The greater scarcity of specialist physicians and psychosocial services in the other regions may have an impact on

the quality of follow-up care. In fact, the analyses also showed that the number of outpatient visits in the year prior to death among outpatient users only was associated with suicide death in the month after a health service contact. This may, in part, be indicative of a lack of specialized services or inpatient care in less populated regions.

Suicide death in the month following emergency department and hospital discharge was also associated with an increased number of general medical disorders. This finding concords with research indicating that individuals with general medical disorders may present more complex mental health clinical profiles, which leads to increased suicide risk (22,23). The analyses also showed that the presence of a psychiatric diagnosis was associated with increased odds of suicide in the month following discharge. Pirkola and colleagues (8) reported that affective disorders and schizophrenia were associated with an increased risk of suicide death within one week of discharge.

There was no evidence that the implementation of the Quebec mental health action plan influenced odds of suicide death in the month following contact with emergency department and inpatient services. Studies in other countries have also found that the national policy initiatives had no impact on suicide rates in the early years after their introduction (24,25). Some researchers have shown that results of policy initiatives in public health are more likely to be visible five or more years after the policy's introduction (26). It should be mentioned that during the study period, suicide rates among adolescents in Quebec decreased. During this period, other population-based suicide prevention strategies were in place, such as a literacy program for adolescents called Partners for Life/Solidaire Pour la Vie and protocols for ensuring liaison between emergency



departments and youth centers for adolescents and regional addiction centers (27).

The results of this study should be considered in light of the following limitations. First, analyses were based on data collected in the RAMQ's health administrative databases. Although these databases are valuable research tools, the data are collected for administrative purposes and do not include some important variables, such as income, level of education, and marital status, that have been associated with the risk of suicide (28). We did, however, control for drug coverage provided by the public insurance plan, which in part controls for employment status. Private insurance plans may also confer access to additional mental health services, such as psychotherapy, that are not covered by public health insurance plans. Second, these administrative databases do not cover contacts with health and social services rendered by community organizations or crisis help lines. Psychological autopsy studies have shown very low use of these services (4), as have epidemiologic surveys on mental health. Third, we were not able to measure and study other population-based suicide prevention strategies in Quebec. Fourth, this study was based on a cohort of individuals who had died by suicide and did not include a control group of persons who had died from other causes. The comparisons were based on use of services by persons who died by suicide in the month following their last contact or more than one month after the last contact. The results showed that later suicide was associated with an increased number of outpatient contacts. However, this finding can be interpreted, in part, as an indicator that persons who died sooner may not have had the same opportunity to attend outpatient consultations compared with persons who died later. Fifth, for emergency department and outpatient contacts that occurred on the same day, it was not possible to ascertain which came first, which may have biased the results.

Notwithstanding these limitations, the major findings of this study indicate that the number of consultations after inpatient and emergency department discharge is significantly associated with later suicide. Consultations may differ according to the profile of need, but the effectiveness of consultation depends upon the quality of primary and specialist mental health care. Audits of health care services among people with mental disorders, such as the survey in New Brunswick (4) and the United Kingdom National Confidential Inquiry on Suicide and Homicide (33), pointed toward key deficits in services provision or coordination. Reduction in suicide rates have been documented when recommendations to fill these service deficits are implemented (29).

## CONCLUSIONS

To our knowledge, this is the first Canadian study to assess the factors associated with suicide in the month following contact with different types of health services. The data set covered all suicide deaths in the province of Quebec during a seven-year period. As Pirkola and colleagues (8) highlighted,

studying the use of services prior to suicide can elucidate patterns of health service use that are associated with longer times to suicide and add time for follow-up care and suicide prevention.

Bickley (10) suggested that programs that deliver community mental health services to individuals who have a severe mental illness and who are at risk of suicide—such as the Care Program in the United Kingdom—can have a positive impact. In Quebec, new clinical guidelines have been proposed to focus on the identification and follow-up of patients in emergency departments who are at high risk of suicide (30,31). The guidelines ensure that a nurse or liaison health professional is present at all times to provide appropriate follow-up with a mental health and addictions specialist during the 48 hours following discharge. For people discharged from a hospital, the guidelines prescribe continued follow-up at home to ensure continuity of care and evaluation of crisis level. Future research should focus on the evaluation of such programs in different health care contexts.

## AUTHOR AND ARTICLE INFORMATION

Dr. Vasiliadis is with the Department of Community Health Sciences, University of Sherbrooke, Longueuil, Quebec, Canada (e-mail: helen-maria.vasiliadis@usherbrooke.ca). Dr. Ngamini-Ngui is with the Centre de Réadaptation en Dépendance de Montréal, Institut Universitaire, Montréal, Quebec. Dr. Lesage is with the Institut Universitaire en Santé Mentale de Montréal, Quebec.

This study was supported in part by a Quebec Health Research Fund (Fonds de Recherche en Santé du Québec (FRQ-S)) research grant for young investigators held by Dr. Vasiliadis and by FRQ-S research grant 16162. Dr. Vasiliadis is a J2 Research Scholar with the FRQ-S. The authors thank Djamal Berbiche, Ph.D., for work on merging the administrative databases and data set preparation.

Dr. Lesage reports receiving research grant and advisory panel payments from "Prends Soins de Toi" improvements in primary mental health care financed by AstraZeneca. The other authors report no competing interests.

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